PUBLIC PAGE

Quarterly Report

Date of Report: October 15, 2007

Contract Number: DTPH56-05-T-0003

Prepared for: United States Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Office of Pipeline Safety

Project Title: "Consolidated Research and Development Program to Assess the Structural Significance of Pipeline Corrosion"

Prepared by: Mr. Vinod Chauhan
Principal Investigator
Advantica, Inc.
Ashby Rd.
Loughborough, LE11 3GR, England
vinod.chauhan@advanticagroup.com

Mr. Ian Wood
Team Project Manager
Electricore, Inc.
27943 Smyth Drive, Suite 105
Valencia, CA 91355
ian@electricore.org

Mr Mark Piazza
Team Technical Coordinator
Pipeline Research Council International, Inc.
1401 Wilson Blvd, Suite 1101
Arlington, VA 22209
mpiazza@prci.org

For quarterly period ending: September 30, 2007

Technical Status

The DOT PHMSA approved Electricore's proposal for additional work scope to address issues related to the guidance on the use of ASME B31G and RSTRENG for high strength steels with deep defects. This work will modify the existing draft report (submitted to the DOT in July 2007) to include figures with and without the suspect grade B pipe. Also, certain tables will be modified to illustrate the changes to the statistical assessments with and without including the results from the suspect grade B tests. Additionally, the follow on work will:

1. Derive confidence levels of calculated failure pressures using ASME B31G, Modified ASME B31G, RSTRENG and SHELL92 against the burst test results; and
2. Determine confidence levels for each of the assessment methods above with data split according to pipe grade ranges B/X42, X52, X60, X65 and X80/X100.

If necessary, as this part of the work progresses, Advantica may liaise with PHMSA to ensure that meaningful results are obtained. On completion of this work, additional tables/figures and accompanying discussion will be included in the report to summarize the findings of the studies. It is anticipated that this work will be available for review by PHMSA in November 2007.

1. Ring Expansion Tests

All ring expansion tests on grade X100 pipe have been completed and the results presented in the April to July 2007 quarterly progress report.

2. Small Scale (Miniature) Tests

The small scale miniature test results were reported in the April to June 2007 quarterly report. At that stage it was reported that the results from the micro flat tensile specimens only provide the **relative change** in material properties thru the pipe wall. Additional calibration of the results from micro flat tensile specimens would be required using standard round bar tests and that this additional calibration will be undertaken by the external test house, GKSS in the next quarter (July to September 2007). GKSS have confirmed that the testing has been completed. Advantica are now waiting for a formal report from GKSS which describes all the test results. The report is expected in the first half of the next reporting period.

3. FE Analysis to Predict Failure of Higher Strength Corroded Pipelines

Because of the delay in receiving the results, the FE study to predict failure of grade X100 pipelines has now been scheduled to be completed by the end of the next quarter (December 2007). In the absence of the grade X100 data, work is still progressing with the generation of 48" diameter x 0.78" wall thickness (D/t=61.6) FE models.

4. Review of the Remaining Strength of Corroded Pipelines and Assessment of Deep Defects in Higher Strength Pipelines

As reported in the April to July 2007 quarterly report, Advantica's Draft Report (Advantica Report Number 6781) has already been issued for comment to PHMSA and PRCI. Both PHMSA and PRCI have reviewed the report and further work has been commissioned. This work is scheduled to be completed in the following quarter.

Payable Milestones

Due to the delay in obtaining stress versus strain data on grade X100 material from the external test house, the payable milestone task 16 will be delayed to the end of the next quarter (December 2007). The only payable milestone for this quarter is:

- Tenth Quarterly Status Report Submitted (Task No. 19; Item No. 25)

Results and Conclusions

FE Analysis to Predict Failure of Higher Strength Corroded Pipelines

Non-linear models with external defects (patch, axial groove, circumferential groove and pit) have been generated for higher strength pipelines, see for example Figure 1 and 2.

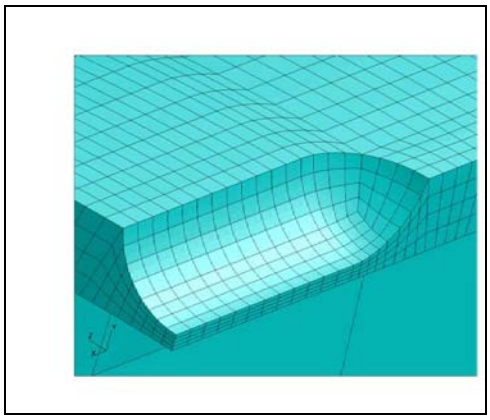

Figure 1 80% Axial Groove Model

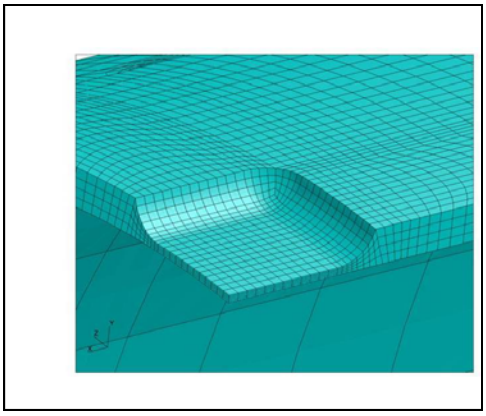

Figure 2 80% Deep Patch Model

While Advantica await the results of the small scale test results on grade X100 pipe, analyses on grade X80 material is being progressed (item 17). A series of non-linear FE analyses will be undertaken. Axial groove, circumferential groove, patch and pit defects will be modeled for defect depths of 20%, 50% and 80% of the pipe wall.

Stress versus strain curves for grade X80 material has been obtained from the public domain and a PRCI member company. The true stress strain relationship was obtained from round bar tensile tests. This data is consistent with that used in Advantica Report Number 9017 entitled 'Corrosion Assessment Guidance for Higher Strength Steels'.

It is estimated that at least 100 non-linear analyses will be required to generate failure locus diagrams for grade X80 and X100 pipe similar to those generated for lower pipe strength grades presented in Advantica Report Number 9068 entitled 'Remaining Strength of Corroded Pipe Under Secondary (Biaxial) Loading'.

Plans for Future Activity

1. Obtain test results and review report on the X100 material from GKSS
2. Complete FE analyses for grade X80 models
3. Complete FE analyses for grade X100 models
4. Complete draft report